

REMARKS

In response to the Office Action dated 31 January 2003, the applicant respectfully requests reconsideration of the above-identified application in view of the following remarks. Claims 21, 23, 24, 26, 29-33 and 36-75 are pending in the application. Claims 21, 23-24, 26, 29-32, 36-46, 48-59, 60-61, 63-66, 68-69, and 71-74 are rejected, and claims 33, 47, 62, 67, 70, and 75 are objected to. None of the claims have been amended.

Allowable Subject Matter

The Office Action indicated that claims 33, 47, 62, 67, 70, and 75 would be allowable if rewritten in independent form. The applicant reserves the right to rewrite claims 33, 47, 62, 67, 70, and 75 in independent form, but believes that the base claims from which they depend are allowable in view of the remarks made herein.

Rejection of Claims Under §102

Claims 21, 23-24, 26, 29-32, 36-46, and 48-59 were rejected under 35 U.S.C. §102(e) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a) as obvious over Ohba et al. (U.S. 5,734,181, Ohba). The applicant respectfully traverses.

Ohba issued in March, 1998, which is after the July 1997 filing date of the parent application. The applicant does not admit that Ohba is prior art, and reserves the right to swear behind Ohba at a later date.

Claim 43 recites a method of fabricating a transistor comprising, among other elements, forming a source region and a drain region in a substrate, forming an insulating layer on the substrate, forming a layer of a silicon carbide compound $\text{Si}_{1-x}\text{C}_x$ on the insulating layer wherein x is between 0 and 1.0, and removing portions of the insulating layer and the layer of the silicon carbide compound $\text{Si}_{1-x}\text{C}_x$ to form a gate on the substrate.

Ohba relates to a method of manufacturing a semiconductor device, and describes forming an insulating film and a polysilicon film in sequence on a p-type silicon substrate 2. A gate insulating film 4 and a gate electrode 6 are formed by patterning the films. Carbon ions are implanted in source and drain regions in the substrate 2 using the gate electrode 6 as a mask.

The substrate 2 is then annealed at 1400 degrees C to form SiC on the surface of the substrate 2. Ohba, column 6, lines 4-19.

Ohba does **not** show forming a layer of a silicon carbide compound $\text{Si}_{1-x}\text{C}_x$ on the insulating layer and removing portions of the insulating layer and the layer of the silicon carbide compound $\text{Si}_{1-x}\text{C}_x$ to form a gate on the substrate as recited in claim 43.

The Office Action states that “carbon ions implanted into the semiconductor substrate [of Ohba] for forming source and drain region 8a,8b are also inherently implanted into the polysilicon gate 6” of Ohba. Office Action, page 2. This statement of inherency does not show forming a layer of a silicon carbide compound $\text{Si}_{1-x}\text{C}_x$ on an insulating layer as recited in claim 43. The Office Action is apparently rejecting the claims based on the theory that the steps of Ohba result in the same structure as the method of claim 43. The MPEP states the following with regard to rejections based on inherency:

“In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art.” MPEP 2112 (emphasis in original).

“To establish inherency, the extrinsic evidence ‘must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.’” MPEP 2112.

The Office Action has not met the burden set out in the MPEP for establishing a rejection based on inherency. Ohba does not say that its method results in SiC in the gate electrode 6. Ohba does not show SiC in the gate electrode 6. The Office Action has not presented evidence that the method of Ohba necessarily results in SiC in the gate electrode 6. Ohba states that the gate electrode 6 is used as a mask during the implantation of carbon ions. There is no evidence that carbon ions are also implanted in the polysilicon of the gate electrode 6. Ohba states that an annealing step is necessary to form SiC in the silicon substrate 2. There is no evidence that this annealing step results in SiC formation in the gate electrode 6 of Ohba. The Office Action has not provided a basis in fact and/or technical reasoning to show that SiC is necessarily formed in the gate electrode 6 due to the method of Ohba.

The applicant respectfully submits that a *prima facie* case of anticipation of claim 43 based on the theory of inherency in view of Ohba has **not** been established in the Office Action, and that claim 43 is in condition for allowance.

For reasons analogous to those stated above, and the limitations in the claims, the applicant respectfully submits that a *prima facie* case of anticipation of claims 21, 23-24, 26, 29-32, 36-42, 44-46, and 48-59 based on the theory of inherency in view of Ohba has **not** been established in the Office Action, and that claims 21, 23-24, 26, 29-32, 36-42, 44-46, and 48-59 are in condition for allowance.

The MPEP states the following with regard to rejections under 35 USC § 103: “To establish a *prima facie* case of obviousness ... there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings.” MPEP 2143. A Federal Circuit opinion states that the suggestion or motivation to combine references must be found in the prior art. MPEP 2143 citing *In re Vaeck*, 20 USPQ2d 1438, 1442 (Fed. Cir. 1991). In addition, the Federal Circuit, in *In re Lee*, 61 USPQ2d 1430 (Fed. Cir. 2002), requires that the suggestion or motivation to combine references “be based on objective evidence of record.” The Federal Circuit also indicated that the suggestion or motivation must be specific. 61 USPQ2d at 1433. *In re Lee* is referenced in MPEP 2143.01, page 2100-125.

Regarding other limitations including deposition techniques, the Office Action stated that “it would have been obvious.....to use any available and well known deposition techniques to deposit a silicon carbide compound on the gate insulating layer because these deposition techniques have been proven in the art to be able to effectively form a reliable and excellent layer.” Office Action, page 2. The Office Action goes on to give examples, but does not cite any evidence in the record of suggestions or motivations to modify Ohba as is required by *In re Lee*.

The applicant respectfully submits that a *prima facie* case of obviousness of claims 21, 23-24, 26, 29-32, 36-46, and 48-59 has **not** been established in the Office Action, and that claims 21, 23-24, 26, 29-32, 36-46, and 48-59 are in condition for allowance.

Rejections of Claims Under §103

Claims 21, 23-24, 26, 29-32, 36-46, and 48-59 were rejected under 35 USC § 103(a) as being unpatentable over Chamberlain (U.S. 4,473,836) taken with Halvis et al. (U.S. 5,369,040, Halvis). The applicant respectfully traverses.

The Office Action stated that "it would have been obvious.....to replace the polysilicon gate of Chamberlain with the gate of silicon carbide compound....as taught by Halvis et al. This is because polysilicon and silicon carbide are art recognized alternative semiconductor materials for substitution in forming the gate, wherein polysilicon and silicon carbide are high electrical conductive materials that is good for forming the gate." Office Action, page 3. The Office Action does not cite any evidence in the record of this suggestion to combine Chamberlain and Halvis as is required by *In re Lee*.

The "Response to Arguments" section of the Office Action states that "by alternatively using polysilicon or silicon carbide as a gate material, together with a cover layer thereon, the principle of operation of the device of Chamberlain is still the same and would be satisfactory for its intended purpose of detecting incident light....Chamberlain teaches the substitution of alternative materials including aluminum or polysilicon." Office Action, page 7. The Office Action also says that "since *Halvis* prima facie teaches...to use silicon carbide compound $\text{Si}_{1-x}\text{C}_x$...for forming a gate on the gate insulating layer, instead of using polysilicon gate....one of ordinary skill in the art would motivate and recognize the alternative use of aluminum, polysilicon or silicon carbide for forming a gate of Chamberlain." Office Action, page 7. However, Halvis uses a gate of polysilicon with added carbon precisely because the carbon makes the polysilicon more transparent to visible light. This is stated in Halvis in the abstract, in column 2, lines 18-24, and in column 3, lines 23-35. There is no reason to add carbon to a polysilicon gate if the gate is to be covered to be impervious to light as stated in Chamberlain, column 3, lines 25-26.

The Office Action has not identified evidence of a suggestion to combine Chamberlain and Halvis.

The applicant respectfully submits that a *prima facie* case of obviousness of claims 21, 23-24, 26, 29-32, 36-46, and 48-59 has **not** been established in the Office Action, and that claims 21, 23-24, 26, 29-32, 36-46, and 48-59 are in condition for allowance.

Claims 21, 23-24, 26, 29-32, 36-46, 48-59, 60-61, 63-66, 68-69, and 71-74 were rejected under 35 USC § 103(a) as being unpatentable over Yamazaki et al. (U.S. 5,449,941, Yamazaki) taken with Halvis. The applicant respectfully traverses.

The Office Action states that “it would have been obvious.....to replace the polysilicon gate of Yamazaki with the floating gate of silicon carbide...as taught by Halvis et al. This is because polysilicon and silicon carbide are art recognized alternative semiconductor materials for substitution in forming the gate as combinatively taught by Yamazaki and Halvis et al, wherein polysilicon and silicon carbide are high electrical conductive materials that is good for forming the gate.” Office Action, page 4. The Office Action does not cite any evidence in the record of this suggestion to combine Yamazaki and Halvis as is required by *In re Lee*.

Regarding other limitations including deposition techniques, the Office Action stated that “it would have been obvious.....to use any available and well known deposition techniques to deposit a silicon carbide compound on the gate insulating layer because these deposition techniques have been proven in the art to be able to effective form a reliable and excellent layer.” Office Action, page 4. The Office Action goes on to give examples, but does not cite any evidence in the record of suggestions or motivations to combine Yamazaki and Halvis as is required by *In re Lee*.

The applicant respectfully submits that a *prima facie* case of obviousness of claims 21, 23-24, 26, 29-32, 36-46, 48-59, 60-61, 63-66, 68-69, and 71-74 has **not** been established in the Office Action, and that claims 21, 23-24, 26, 29-32, 36-46, 48-59, 60-61, 63-66, 68-69, and 71-74 are in condition for allowance.

Claims 21, 23-24, 26, 29-32, 36-46, 48-59, 60-61, 63-66, 68-69, and 71-74 were rejected under 35 USC § 103(a) as being unpatentable over Halvis and Chamberlain or Frye et al. (U.S. 4,118,795, Frye), and further in view of Tohyama (U.S. 5,858,811). The applicant respectfully traverses.

The Office Action states that “[i]t would have been obvious.....to form diffused regions functioned as source and drain.....because of the desirability to use source and drain regions for storing and transferring electrical charge....because of the desirability to control the desired thickness of the gate insulating layer.” Office Action, pages 5-6. The Office Action does not cite any evidence in the record of this suggestion to combine Halvis, Chamberlain or Frye, and Tohyama as is required by *In re Lee*.

Regarding other limitations including deposition techniques, the Office Action stated that “it would have been obvious.....to use any available and well known deposition techniques to deposit a silicon carbide compound on the gate insulating layer because these deposition techniques have been proven in the art to be able to effective form a reliable and excellent layer.” Office Action, page 6. The Office Action goes on to give examples, but does not cite any evidence in the record of suggestions or motivations to modify Halvis, Chamberlain or Frye, and Tohyama as is required by *In re Lee*.

The “Response to Arguments” section of the Office Action states that “[t]he structure as shown in Figure 4 of Chamberlain is not a final product since other final passivation and protective insulating layer would be formed over the source and drain regions but not shown in the drawing figure....” Office Action, pages 7-8. The Office Action has not identified evidence in the record to support this statement, and it does not provide a motivation for combining Halvis, Chamberlain or Frye, and Tohyama that is missing in the rejection.

The applicant respectfully submits that a *prima facie* case of obviousness of claims 21, 23-24, 26, 29-32, 36-46, 48-59, 60-61, 63-66, 68-69, and 71-74 has **not** been established in the Office Action, and that claims 21, 23-24, 26, 29-32, 36-46, 48-59, 60-61, 63-66, 68-69, and 71-74 are in condition for allowance.

CONCLUSION

The applicant respectfully submits that all of the pending claims are in condition for allowance, and such action is earnestly solicited. The Examiner is invited to telephone the below-signed attorney at 612-373-6973 to discuss any questions which may remain with respect to the present application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743

Respectfully submitted,

LEONARD FORBES ET AL.


By their Representatives,

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. Box 2938
Minneapolis, MN 55402
612-373-6973

Date

30 April 2003

By


Robert E. Mates
Reg. No. 35,271

CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being deposited with the United States Postal Service with sufficient postage as first class mail, in an envelope addressed to: Commissioner of Patents, Washington, D.C. 20231, on this 30th day of April, 2003.

Name

Amy Mordardy

Signature

